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SOME CASES OF CUTANEOUS MYIASIS, WITH NOTES ON THE LARVAE OF *WOHLFAHRTIA VIGIL* (WALKER)

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In this JOURNAL, the writer published (1920) a report of two cases of cutaneous myiasis in very young infants, both of which occurred at Toronto, Ont., during June, 1919. From the second case four adults of *Wohlfahrtia vigil* (Walker) were reared and from a comparison of the larvae taken from the two cases and the close similarity of the clinical pictures which they presented, it was decided beyond any doubt that the first case was due to the same species of fly.

These two cases were of special interest, owing to the fact that nothing had been previously known of the habits of either of the two North American species of Wohlfahrtia, although a European species, *W. magnifica,* is well known as a parasite of both man and certain of the domestic animals, having habits similar to those of the American Screw-worm Fly *(Chrysomyia macellaria)*. A difference, however, was noted in the cases described and those due to *W. magnifica,* as described by Portchinsky and others, in so far as, in the latter, the larvae are always described as entering through one of the natural orifices, such as the nose, mouth or ear, or through a wound or sore, while in the cases due to *W. vigil* the lesions were scattered over an otherwise healthy and uninjured skin.

During 1921 another case occurred at Toronto and the writer was again successful in rearing *W. vigil* from it. This case was in a boy 5 months old (Pl. XXX) * and was brought to the Sick Children's Hospital from the Infants' Home on September 2. Most of the lesions were clustered together on the left side of the neck under the angle of the jaw, one being on the left cheek. They had been first noticed by the mother 24 hours earlier, and when seen by the writer they were already secondarily infected with pus organisms, the child being in a poor general condition and suffering from an intestinal disorder. They were similar to the lesions observed in the previous cases, each being a boillike sore with an external opening, and from these openings five or six larvae had already been expressed. Only three additional larvae were obtained, these measuring 5 to 7 mm. in length. Each was placed on raw beef in a separate test-tube, plugged with cotton wool. In 24 hours they reached a length of 12 to 13 mm. and in another 24 hours they were full-grown, each measuring about 17 mm. in length.

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* I am indebted to Dr. M. J. Brady for the excellent photograph of this case.

On the third day after their removal from the child the larvae were placed with the meat in a jar of earth and immediately burrowed into the latter. Next day they were at the bottom of the jar and two of them had begun to contract. Three days later they were dug up and all had transformed into puparia.

On September 27, 18 days later, a male *Wohlfahrtia vigil* emerged. I waited for the others to appear until October 5, but neither having emerged by that time I opened one of the puparia on that day and the other a week later, and in both I found pupae which had evidently died some time before the proper time for emergence, as they were quite colorless. In this case, like the previous ones, the child recovered rapidly after the removal of the maggots.

Since publishing my account of the first two cases I cleared several of the larvae with potash, including the only larva I have from case 2. Two of the larvae from case 1 belong to the first instar, the others to the second, while the single specimen from case 2 belongs to the third instar.

The first instar has recently been described by Johannsen (1921), who also determined that *W. virgil* is larviparous like other Sarcophagidae. No description has yet appeared, however, of the buccopharyngeal sclerites of the first and second instars, and it seems desirable that these should be described, in order to facilitate the recognition of this parasite in any stage in which it may be found. In this connection I wish to thank Professor Johannsen for his kindness in sending me one of the three larvae on which his description was based.

In Professor Johannsen's specimen of the first instar (Figs. 1, 4) the cuticular spines are somewhat larger than in the second stage, but this is scarcely noticeable in my specimens, which are a little more advanced in development and were apparently boiled in too strong a solution of potash. The posterior spiracles have two slits each and the anterior spiracular processes, though not yet apparent externally, can be seen beneath the skin. They are very small, but the ten spiracular papillae are already visible.

In the second instar the cuticular spinules are still fairly prominent, the posterior spiracles are relatively larger, with two slits each, and the anterior spiracular processes are already well developed, each bearing 9 or 10 spiracular papillae.

In the third instar the spinules are very minute and unchitinized. The anterior spiracular processes (Fig. 6) are practically unchanged. The posterior spiracles (Fig. 7) have three nearly vertical slits, somewhat convergent ventrad, the outer slit being a trifle shorter than the other two. Each is divided very unequally into a series of openings, some rounded, others subrectangular, by transverse bars of very irregular form. A submarginal series of short, spine-like cuticular processes project inward toward the orifices.

The Bucco-Pharyngeal Sclerites

First Instar (Figs. 1, 4, 5).—In his description of this stage Johannsen states that there is a pair of lateral mouth-hooks but no median hook, such as is described by Portchinsky (1875) as occurring in the first stage of *W. magnifica*. The median hook, which according to Keilin (1915) occurs in the primary larvae of nearly all Cyclorraphous Diptera, must have been completely retracted in the specimens examined by Johannsen, for it is much more prominent than the lateral ones, which are, in fact, not the true lateral hooks at all, but the oral rods (*baguettes orales* of Keilin), the true paired hooks or "mandibular sclerites" first appearing in the second instar.

The median or "labral" hook (*mh*) arises from a slightly divided base, immediately in front of the pharyngeal sclerites and is strongly decurved, the pointed apex projecting slightly from the front part of the oral aperture in the usual position. The lateral, oral rods (*or*) are well developed, though not very strongly chitinized. Each is divided into a short, subvertical, proximal piece, situated laterad of the basal half of the median hook, and a larger and more slender, distal, horizontal piece, bounding the oral aperture laterally, and terminating just in front of the latter in a slightly projecting apex, which is indistinctly toothed.

The pharyngeal or lateral sclerites (*ps*) are narrow in the middle; the dorsal arch is narrow and extends well forward, while the dorsal and ventral cornua are long and slender, the former being the larger and more heavily chitinized (Fig. 1).

Second Instar (Fig. 2).—At this stage the median hook has of course disappeared, being replaced by the lateral mouth-hooks (*lh*). These have a stout base, somewhat elevated above, and produced ventrad into a stout process. From this base they are regularly curved and tapered, terminating in slender apices. Close to the ventral process is a slight chitinization, which is apparently the rudiment of the dentate sclerite (*ds*). The hypostomal sclerite (*hs*), or *"pièce intermédienne,"* is fully separate from the pharyngeal sclerites and is of large size, with a prominent ventral projection.

The pharyngeal sclerites have changed considerably in form. The lateral wings are broader in the middle. The dorsal cornua are deeply bifurcate, the lower branch being the longer, the slenderer and the more strongly chitinized. The ventral cornua are also bifurcated, but the branches are as yet ill-defined.

Third Instar (Fig. 3).—The bucco-pharyngeal apparatus of this stage has already been described from the structure removed from the puparium, but it was discovered afterwards that the tips of the mouth-hooks were broken off. They have in the specimen examined a relatively smaller base, which is not elevated dorsally, but is more angular ventrally than in the second instar; and the hooks are a little stouter and are strongly decurved. A small dentate sclerite is present, and is separate from its fellow of the opposite side. The hypostomal sclerite is relatively smaller. The dorsal arch of the pharyngeal sclerites projects farther forward; the bifurcations of the dorsal cornua are broader and more strongly defined, as are also the ventral cornua, the bifurcations of the latter being much shorter than those of the former.

A fourth case of cutaneous myiasis, probably due to *Wohlfahrtia vigil,* was kindly reported to me by Dr. W. D. Wiley of Brantford, Ont., where the case was observed during June, 1921. The infant was three weeks old and had been placed outside in the shade of a tree by its mother. The lesions, from which the maggots were removed, consisted of 12 or 14 "small, slightly red, pustular spots" distributed "on the front and right side of the neck, and on the anterior surface of the right forearm, or, as the mother remarked 'just on the exposed parts.' "

Finally, a case may be mentioned that occurred at Pittsburgh, Pa., in October, 1920, of an infant that was severely infested with fly larvae, but of a different species. Two specimens of the larvae from this case were received by Dr. L. O. Howard, Chief of the U. S. Bureau of Entomology, who referred them to Dr. J. M. Aldrich. To Dr. Howard I am indebted for correspondence containing data on the clinical features of the case, and to Dr. Aldrich I owe the privilege of studying the larvae. The physician in charge of the case states that the child's body was "alive with these crawlers and was covered with a miliaria and a few furuncles. The mother noticed some of the parasites emerging from the furuncles and from the rectum and vagina."

The two larvae measured 2.4 and 2.5 mm. in length and both belong to the first instar (Fig. 8). They differ very considerably from Wohlfahrtia, being, in fact, not Sarcophagids, but resembling much more closely the primary larvae of Musca and Muscina. In fact they resemble the first instar of *Musca domestica* very closely, except in the points given below.

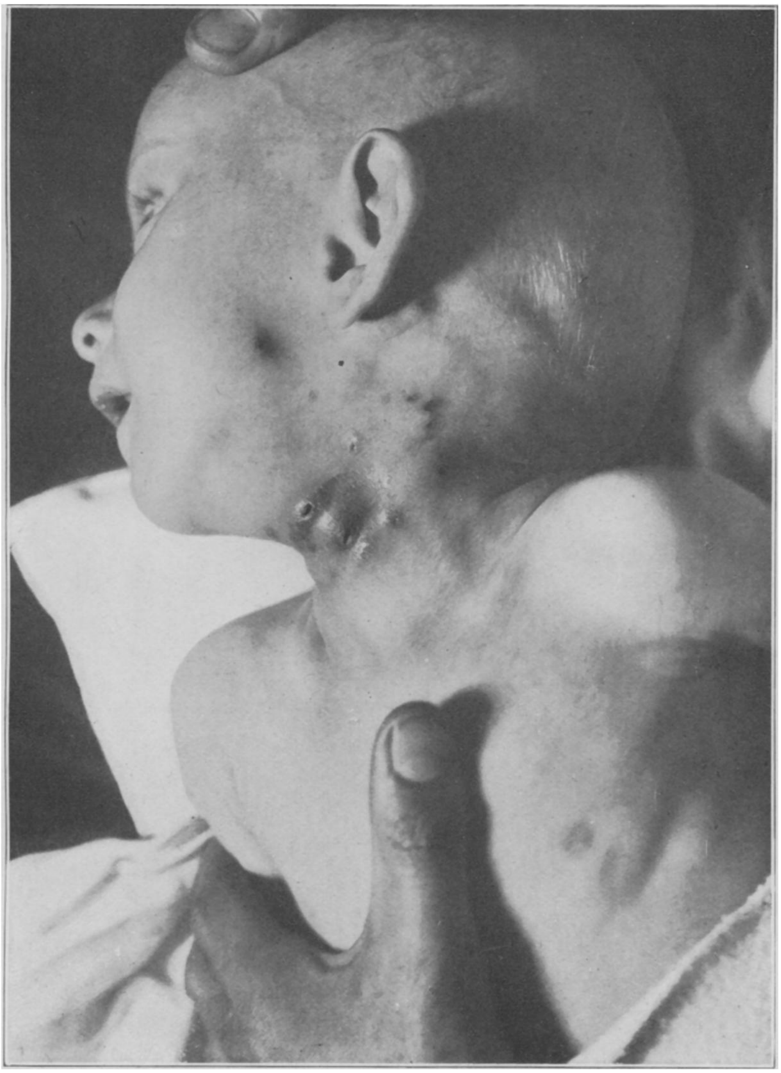

PLATE I

Male infant, five months old, infected with larvae of *Wohlfahrtia vigil* (Walk.). Case 3.

EXPLANATION OF PLATES

EXPLANATION OF PLATE II

Wohlfahrtia vigil (Walk.); larval structures.

Fig. 1.—First instar, lateral view of anterior segments; *an,* antenna; *mp,* so-called maxillary palpus; *mh,* median hook; *or,* oral rods; *ps,* pharyngeal sclerite; *da,* dorsal arch; *dc,* dorsal cornua; *vc,* ventral cornua.

Fig. 2.—Second instar, lateral view of bucco-pharyngeal sclerites; *lh,* lateral mouth-hooks; *ds,* dentate sclerite; *hs,* hypostomal sclerite; other lettering as before.

Fig. 3.—Third instar, lateral view of bucco-pharyngeal sclerites; *asp,* anterior spiracular process; other lettering as before.

Fig. 4.—First instar, ventral view of anterior end of body; from Professor Johannsen's specimen. Lettering as before.

Fig. 5.—First instar; ventral view of bucco-pharyngeal sclerites; larva from Case 1.

Fig. 6.—Third instar; left anterior spiracular process.

Fig. 7.—Third instar; left posterior spiracular plate.

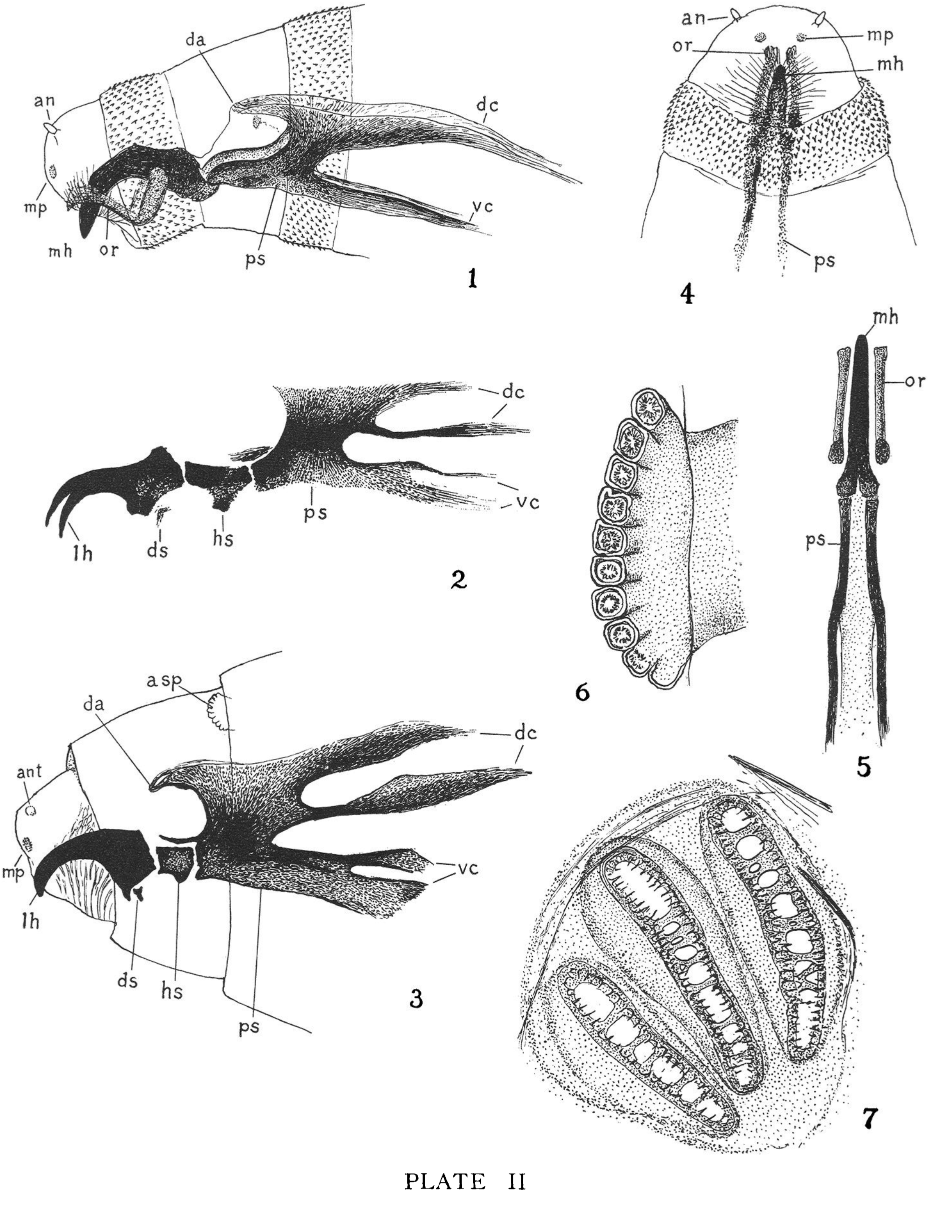

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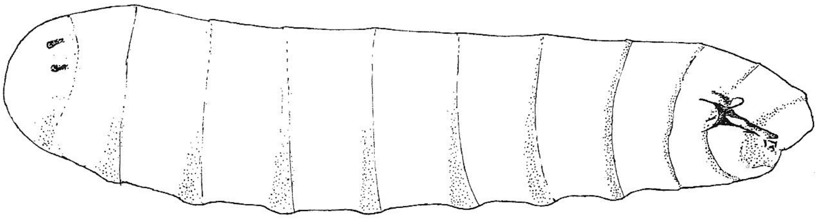
PLATE II



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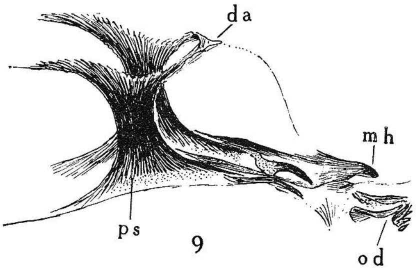

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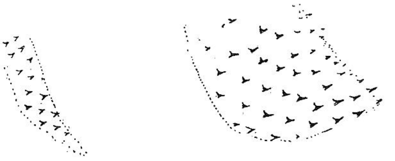

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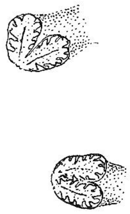

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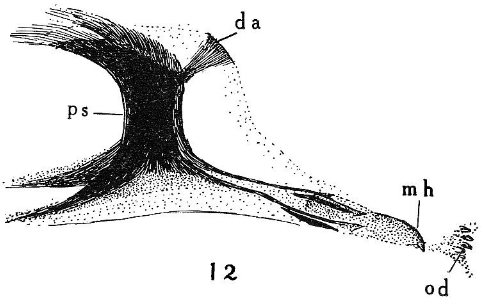

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PLATE III

Fig. 8.—Larva from the Pittsburgh case.

Fig. 9.—Same; bucco-pharyngeal sclerites; *od,* denticles around the mouth; other lettering as before.

Fig. 10.—Same; spinules from the ventral portions of the first two annuli.

Fig. 11.—Same; posterior spiracular plates.

Fig. 12.—*Musca domestica* L.; bucco-pharyngeal sclerites.

In the house-fly there are no complete spinulose annuli, while in the Pittsburgh larvae segments 2 to 5 each have a narrow annulus, which is complete and scarcely widened ventrally, except slightly on segment 5. On segment 6 the annulus is widened below but narrows above almost to the vanishing point, while on the remaining segments the annuli are incomplete dorsally, becoming successively more restricted to the ventral surface. The pharyngeal sclerites (Fig. 9) are similar to those of Musca (Fig. 12) but the dorsal arch is much narrower, and the anterior, ventral prolongations, from which are developed the hypostomal sclerites, are considerably shorter. The median hook is of similar size but is somewhat less abruptly pointed at the apex. The denticles around the oral aperture (*od*) are coarser than in Musca. The posterior end of the body is convexly rounded, without papillae, and the posterior spiracles are not sunk into a pit as they are in the Sarcophagidae. Each has two slits, but the outer margins of these slits are continuous ventrad with one another (Fig. 11). Each is bordered with small, inwardly directed, chitinous processes.

I have as yet been unable to identify the species to which these larvae belong, but it is hoped that the descriptive notes and figures here given will make possible their determination at some future time when the earliest stages of our muscoid larvae are better known.

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CORRECTION

In my paper cited above (Walker, 1920: 3, last paragraph), I carelessly ascribed the genus Wohlfahrtia to Aldrich, whereas it was erected by Brauer and von Bergenstamm (Zweifl. Kais. Mus., 4: 123, 1889).